March 26, 2002

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REVIEW OF DTSC-APPROVED "BASELINE HEALTH RISK ASSESSMENT" AND SUPPLEMENTAL RISK CALCULATIONS; WALKER PROPERTY, SANTA FE SPRINGS, CALIFORNIA

Dear Mr. Rooney:

This letter presents a review and supplemental risk calculations associated with human health at the Walker Property located in Santa Fe Springs (hereafter referred to as "the property").

The supplemental risk calculations are based primarily on our review of the California Environmental Protection Agency/Department of Toxic Substances Control-approved (DTSC-approved) *Baseline Health Risk Assessment*[1] (hereafter referred to as the "BHRA"). The following documents were also reviewed and considered in this effort:

- Harding Lawson Associates. 1993. *Remedial Investigation/Feasibility Study Workplan (Volume I); Walker Property Site; Santa Fe Springs, California*. April 23rd. Selected figures only.
- Harding Lawson Associates. 1995. *Remedial Investigation (Volumes I through III); Walker Property Site; Santa Fe Springs, California*. August 25th.
- Harding Lawson Associates. 1997. *Fate and Transport/Human Health Risk Assessment, 12354 Lakeland Road, Santa Fe Springs, California*. March 21st.
- Thienes Engineering. 2002. "Conceptual Grading Plan for Lakeland/Bloomfield" (Sheet 1 of 1). Last update: March 5, 2002.

The focus of this effort is based on our understanding of your concerns, obtained through conversations with you on March 5th and 6th, the conference call held at Sares-Regis Group's offices on March 6th, and the meeting held at the Santa Fe Springs Fire Department on March 12th.

This effort is not intended to be a formal, comprehensive revision of the BHRA suitable for submission to a regulatory agency such as the DTSC. Rather, this effort is intended to provide an evaluation of exposure scenarios not included in the BHRA that may be relevant now that a site development plan is in place.[2] It is noted, however, that the quantitative procedures and calculations presented herein are identical to those that we would present in a formal risk assessment report to DTSC or any other regulatory agency.

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[1] Harding Lawson Associates (HLA). 1995. *Baseline Health Risk Assessment (Volume IV); Walker Property Site; Santa Fe Springs, California*. August 25th.

[2] There were no formal development plans in place when the BHRA was conducted in 1995.

Summary of the BHRA

The BHRA considered "...incidental soil ingestion, dermal contact with soil, and vapor and respirable particulate inhalation for future on-site occupational populations.[3] In sum, soil and air were the only environmental media of interest for the BHRA (i.e., ground-water pathways [inhalation of vapors potentially fluxing from ground water and incidental ingestion] were not included). The chemicals of potential concern (COPCs), and the exposure scenarios, receptors, and pathways considered in the BHRA are summarized in Table 1 of this review.

A leaching analysis, which quantified the potential future concentration of the COPCs in ground water due to the presence of impacted unsaturated zone soils, was also conducted as part of the BHRA.

As shown in Table 1, the PCB-impacted soils (located in the northern portion of the Lakewood section of the property) were determined to be the only COPCs posing a potential risk to the receptors evaluated. Based on this result, this portion of the property was, and remains, capped, which mitigates PCB exposure pathways and associated risk potential. It is our understanding that this cap will not be affected by the proposed development.[4]

Scope of this Review and Supplement

As mentioned above, this effort is intended to evaluate additional exposure scenarios relevant to site development, and not included in the BHRA. Specifically, this effort considers the following:

- Inhalation of volatile organic compound (VOC) vapors, which may potentially flux upward from impacted soil and ground-water into indoor air. The receptor considered is a future indoor adult worker in that portion of the property to be developed as warehouses and associated office space.[5]
- Inhalation of VOC vapors which may potentially flux upward from product-impacted soil[6] into outdoor air in the extreme northeastern corner of the property (i.e., in the immediate vicinity of soil boring E-1 and ground-water monitoring well EW-1).[7] The receptors considered are a future outdoor adult worker (landscaper) and a future outdoor child (trespasser).

Pedestrian "passersby" are not quantitatively evaluated. Due to their low exposure time, potential risks and hazard indices associated with such receptors would be less than those reported for the landscaper or trespasser.

The concentrations of the VOC and fuel hydrocarbon vapors in indoor and outdoor air ("exposure point concentrations" [EPCs]) are estimated using the "Johnson and Ettinger" model (hereafter

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[3] Occupational receptors other than those located at the Balboa Pacific facility.

[4] As shown in Thienes Engineering. 2002. "Conceptual Grading Plan for Lakeland/Bloomfield" (Sheet 1 of 1). Last update: March 5, 2002.

[5] *Ibid.*

[6] Due to the anticipated presence of separate-phase hydrocarbons at the ground water, and the relatively deep water table (~95 feet below ground surface [bgs]), the flux of VOC and fuel hydrocarbon vapors from ground water is not considered.

[7] As shown in Figures 11b ("Groundwater Analytical Results"), 16a ("Petroleum Hydrocarbon Data"), 17 ("Lakeland Road Pipelines Cross Section"), and 18 ("Groundwater Quality and Contour Map"). HLA. 1995. *Remedial Investigation (Volume I).*

referred to as the "J&E model").[8] The cancer risks and hazard indices are estimated using standard EPA dose equations.[9]

The BHRA evaluation of dermal contact, ingestion, and inhalation of particulates reported in the BHRA (see Table 1 of this review) was deemed applicable for future outdoor receptors. It should be noted that, based on site redevelopment plans, there will be a general absence of exposed soil.

Because there are no current occupants (the Balboa Pacific facility is no longer in existence), this supplemental evaluation does not consider a current receptor. It is assumed that personal and perimeter air quality monitoring and dust suppression measures will be taken (per the Soil Management Plan to be reviewed and approved by the Santa Fe Springs Fire Department and South Coast Air Quality Management District, and prepared with consideration to Cal/OSHA requirements) during grading and subsequent building construction; therefore, risk characterization for construction workers and any potential nearby, off-site receptors during construction activities is not evaluated.

SUPPLEMENTAL RISK CHARACTERIZATION

The components of the supplemental risk characterization are:

- Environmental Media of Interest/Supplemental Receptor
- Chemicals of Potential Concern
- Ground-water COPCs for Calculation of Indoor Air EPCs
- Fate-and-Transport Analysis
- Risk Characterization
- Uncertainties

Environmental Media of Interest/Supplemental Receptor

This supplemental evaluation identified indoor air as an additional exposure medium. Source media for indoor air include ground water and soil. The receptor is an indoor worker.

Although outdoor air was evaluated in the BHRA, the extreme northeastern corner of the Railroad Section of the property was not evaluated because the impacts are not site-related. Given the development plan for the property, outdoor air in this area was identified as an additional exposure medium. The source medium for outdoor air is soil and the receptors are an outdoor worker (adult landscaper) and child trespasser.

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[8] U.S. Environmental Protection Agency. 2000. User's Guide for the Johnson and Ettinger (1991) Model for Subsurface Vapor Intrusion into Buildings (Revised). Prepared by Environmental Quality Management, Inc. (Durham, North Carolina) for Pacific Environmental Services, Inc. (Research Triangle Park, North Carolina) for submittal to the U.S. EPA (Office of Emergency and Remedial Response, Washington, D.C.). December.

U.S. Environmental Protection Agency. 2000. User's Guide for NAPL-SCREEN and NAPL-ADV Models for Subsurface Vapor Intrusion into Buildings. Prepared by Environmental Quality Management, Inc. (Durham, North Carolina) for Pacific Environmental Services, Inc. (Research Triangle Park, North Carolina) for submittal to the U.S. EPA (Office of Emergency and Remedial Response, Washington, D.C.). December.

Johnson, P.C. and R.A. Ettinger. 1991. Heuristic model for predicting the intrusion rate of contaminant vapors into buildings. Environmental Science and Technology, 25:1445-1452.

[9] USEPA, 1989. *Risk Assessment Guidance for Superfund (RAGS), Volume I Human Health Evaluation Manual (Part A),* Office of Emergency and Remedial Response. December.

Chemicals of Potential Concern

The chemicals of potential concern (COPCs) are based on site-specific concentrations of VOCs and fuel hydrocarbons in ground-water and soil, as shown in Tables 2 and 3, respectively.[10] To provide a conservative analysis, any detected VOC is included as a COPC in this supplemental evaluation.

Ground-water COPCs for Calculation of Indoor Air EPCs

The COPCs considered to potentially flux as vapors from ground-water to indoor air are:

- 1,1-Dichloroethane (1,1-DCA)
- Vinyl Chloride
- cis-1,2-Dichloroethene (c-1,2-DCE)
- trans-1,2-Dichloroethene (t-1,2-DCE)
- Acetone
- Methylene Chloride
- Benzene
- Ethylbenzene
- Toluene
- Xylenes

To be conservative, the maximum of all ground-water concentration data reported (listed at the bottom of Table 2) are used as input to the J&E model.

Soil COPCs for Calculation of Indoor Air EPCs

The COPCs considered to potentially flux as vapors from soil to indoor air are:

- 1,1,1-Trichloroethane (1,1,1-TCA)
- Tetrachloroethene (PCE)
- Acetone
- Methylene Chloride
- Methyl ethyl ketone (MEK)
- Benzene
- Ethylbenzene
- Toluene
- Xylenes

To be conservative, the maximum concentrations listed in Table 3 (highlighted in yellow) are used to estimate indoor air EPCs.[11]

[10] Table 2 lists the maximum historical ground-water concentrations reported for on-site monitoring wells.

[11] The soil data considered for indoor air included all site data except the PCB-capped area and northeastern corner of the Railroad section where a pipeline release has impacted subsurface soils. No buildings will be constructed in either of these areas. The concentrations of the detected VOCs in these two areas are shown in the gray-shaded portion of Table 3.

Soil COPCs for Calculation of Outdoor Air EPCs

The COPCs considered to potentially flux as vapors from soil to outdoor air (in the northeastern corner of the Railroad section of the property, in the vicinity of fuel hydrocarbon release from the Lakeland Avenue pipeline) are:

- Benzene
- Ethylbenzene
- Toluene
- Xylenes

Given the planned development, these analytes and their respective concentrations in the northeast corner of the Railroad section of the site are considered only in the calculation of outdoor air EPCs.

Given the distribution of these COPCs (concentrations increase with depth), thickness-weighted soil concentrations (the values highlighted in yellow in Table 4) for each COPC are used to estimate outdoor air EPCs in the northeastern corner of the Railroad section of the property.

Fate-and-Transport Analysis

The "Johnson and Ettinger model", a Microsoft Excel-based spreadsheet model, was used to estimate the indoor and outdoor air EPCs. The "DATAENTER" worksheets for the calculation of the indoor air EPCs[12] (Tables 5 and 6) and the outdoor air EPCs (Table 7) are discussed below.

Table 5 (Calculation of Indoor Air EPC – Vapor Flux from Ground Water)

The calculated input parameters are highlighted in yellow and are discussed below. Values not highlighted are "default" J&E model parameters.

- "Initial groundwater conc." – Value from Table 2.
- "Average soil/groundwater temp" – Value is obtained from www.weather.com (Santa Fe Springs, California historical data).
- "Depth below grade to water table" – Value is conservatively estimated to be 85 feet, based on depth to water measurements at the property taken as part of the ground-water monitoring program for the CENCO (formerly Powerine) Refinery.
- "Thickness of Soil Stratum A" and "Thickness of Soil Stratum B" – Values are based on data from the CENCO Refinery and that reported in the RI, the unsaturated zone can be characterized as alternating silt and sand layers with some clay. Approximately 40 feet of the total thickness of the unsaturated zone is comprised of silt, while the remaining 45 feet is comprised of sand.
- "Soil Stratum Directly Above Water Table" – Site-specific data indicate that sands overlie the water table (Stratum B).
- "Soil Type Used to Estimate Soil Vapor Permeability" – Site-specific data indicate that the shallowest soils (i.e., those on which the building slab would be in contact) can be characterized as a silt.
- "Soil Dry Bulk Density", "Soil Total Porosity", and "Soil Water-filled Porosity" (Stratum A and Stratum B) – These values are based on a weighted average of laboratory-measured values

[12] The benzene worksheet is shown for the sake of example. There is a separate worksheet for each indoor air COPC.

from similar soil types at the former Powerine Administration Building (across the street [Lakeland Road] from the CENCO Refinery).[13]

- "Enclosed Space Floor Length", "Enclosed Space Floor Width", and "Enclosed Space Height" – To be conservative, the floor length and width are based on the area of the smallest (northernmost) building planned and a 20 percent 'buildout' for office space. Based on the design drawing,[14] the total area is estimated to be approximately 85,900 feet^2. Assuming that 20 percent is office space, the total indoor worker area is 17,180 feet^2. The width and area are calculated as the square root of the indoor worker area. The enclosed space height is conservatively based on an 8-foot ceiling.

Table 6 (Calculation of Indoor Air EPC – Vapor Flux from Soil)

The calculated input parameters are highlighted in yellow and are discussed below. Values not highlighted are "default" J&E model parameters.

- "Initial soil conc." – Value from Table 3.
- "Average soil/groundwater temp" – Value is obtained from www.weather.com (Santa Fe Springs, California historical data).
- "Depth below grade to bottom of contamination" – Value is conservatively estimated to be 85 feet, based on depth to water measurements at the property taken as part of the groundwater monitoring program for the CENCO (formerly Powerine) Refinery. This assumption, combined with the "Depth Below Grade to Top of Contamination" value (15 cm; ~6 inches), conservatively implies that the impacted soil extends from the base of the building slab all the way to the water table.
- "Thickness of Soil Stratum A" – Value is based on conservative assumption that contaminated soil is present immediately below the building slab.
- "Soil Type Used to Estimate Soil Vapor Permeability" – Site-specific data indicate that the shallowest soils (i.e., those on which the building slab would be in contact) can be characterized as a silt.
- "Soil Dry Bulk Density", "Soil Total Porosity", and "Soil Water-filled Porosity" (Stratum A) - These values are conservatively based on thickness-averaged laboratory-measured values for the sandy soils at the former Powerine Administration Building (across the street [Lakeland Road] from the CENCO Refinery).[15] This assumption is required because, given the conservative vertical extent assumption, only one soil type may be assigned between the impacted soil and the floor slab.
- "Enclosed Space Floor Length", "Enclosed Space Floor Width", and "Enclosed Space Height" – To be conservative, the floor length and width are based on the area of the smallest (northernmost) building contemplated and a 20 percent 'buildout' for office space.

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[13] Harding Lawson Associates. 1997. *Fate and Transport/Human Health Risk Assessment, 12354 Lakeland Road, Santa Fe Springs, California*, March 21st. Prepared for Powerine Oil Company and approved by the Regional Water Quality Control Board (Los Angeles Region).

[14] Thienes Engineering. 2002. "Conceptual Grading Plan for Lakeland/Bloomfield" (Sheet 1 of 1). Last update: March 5, 2002.

[15] Harding Lawson Associates. 1997. *Fate and Transport/Human Health Risk Assessment, 12354 Lakeland Road, Santa Fe Springs, California*, March 21st. Prepared for Powerine Oil Company and approved by the Regional Water Quality Control Board (Los Angeles Region).

Based on the design drawing,[16] the total area is estimated to be approximately 85,900 feet^2. Assuming that 20 percent is office space, the total indoor worker area is 17,180 feet^2. The width and area are calculated as the square root of the indoor worker area. The enclosed space height is based on an 8-foot ceiling.

Table 7 (Calculation of Outdoor Air EPC – Vapor Flux from Soil)

The non-aqueous phase liquid ("NAPL") version of the J&E model is applied to account for the elevated TPH concentrations in the northeastern corner of the Railroad section. The primary difference between the standard J&E model and the NAPL version is that Raoult's Law is used to compute the partitioning of multiple COPCs into the vapor phase in the NAPL version. The standard J&E model uses Henry's Law to compute the partitioning of a single COPC into the vapor phase. Use of the standard J&E model, when a residual ("free") phase is present, results in an overprediction of soil vapor concentrations and subsequently the outdoor air EPCs.

- "Initial soil conc." – Value from Table 3.
- "Depth below grade to top of contamination" – Value is estimated to be 20 feet. This is based on the current estimated depth (30 feet) and the assumption that 10 feet will be removed during grading.
- "Width of Contamination" and "Length of Contamination" – Both values are estimated to be 50 feet, based on site-specific data.
- "Thickness of Contamination" – This value (65 feet) is based on the estimated vertical extent of contamination (30 feet to 95 feet bgs).
- "Average soil/groundwater temp" – Value is obtained from www.weather.com (Santa Fe Springs, California historical data).
- "Thickness of Soil Stratum A" – Based on Figure 17 of the RI, and the assumption that the upper 10 feet will be removed during grading, this value is estimated to be 5 feet.
- "Thickness of Soil Stratum B" – This is the thickness of the remaining (15 feet of) soil (i.e., that between Stratum A and the top of the contaminated soil).
- "Soil Dry Bulk Density", "Soil Total Porosity", and "Soil Water-filled Porosity" (Stratum A and Stratum B) – These values are based on a weighted average of laboratory-measured values from similar soil types at the former Powerine Administration Building (across the street [Lakeland Road] from the CENCO Refinery).[17]
- "Outdoor Space Width" and "Outdoor Space Length" – These values are set equal to the "Width of Contamination" and "Length of Contamination" values, both of which are estimated to be 50 feet, based on site-specific data.
- "Outdoor Space Height" – ASTM[18] default value (2 meters).

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[16] Thienes Engineering. 2002. "Conceptual Grading Plan for Lakeland/Bloomfield" (Sheet 1 of 1). Last update: March 5, 2002.

[17] Harding Lawson Associates. 1997. *Fate and Transport/Human Health Risk Assessment, 12354 Lakeland Road, Santa Fe Springs, California*, March 21st. Prepared for Powerine Oil Company and approved by the Regional Water Quality Control Board (Los Angeles Region).

[18] American Society for Testing and Materials. 1995. Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites. ASTM Designation E 1739-95.

- "Floor-wall seam Crack Width" and "Air Exchange Rate" – These values are iteratively solved for to (a) expose the entire 50-foot by 50-foot outdoor area for emissions and (b) simulate mixing in the outdoor air exposure area due to wind. The wind speed used for the iterative solution is 2.25 meters per second (ASTM default value).

Risk Characterization

The cancer risk and hazard index for the indoor worker, along with the associated toxicity criteria and exposure parameters, are listed in Tables 8 and 9, respectively. The cancer risk and hazard index (2E-07 and 7E-03, respectively) are less than the values that typically trigger an agency-directed remedial response (1E-04 to 1E-06 for cancer risk and 1E+00 for hazard index).

The cancer risk and hazard index for the outdoor worker (landscaper) and trespasser, along with the associated toxicity criteria and exposure parameters, are listed in Tables 10 and 11, respectively. The cancer risks (2E-08 and 9E-10, respectively) and hazard indices (4E-05 and 8E-06, respectively) are less than the values that typically trigger an agency-directed remedial response (1E-04 to 1E-06 for cancer risk and 1E+00 for hazard index).

The cancer risks and hazard indices for all receptors are summarized in Table 12.

Uncertainties

Uncertainties are inherent in the risk assessment process. The potential for underestimation of risk in this supplement evaluation is very low for the following reasons:

- Maximum soil and ground-water concentrations were employed as area-wide averages.
- Default exposure parameters were employed.
- Soil concentrations were assumed to extend from the ground surface to the water table (i.e., throughout the entire unsaturated zone) in the estimation of the indoor air EPCs.
- Soil concentrations (which are the primary risk drivers) are based on data collected in 1993 and 1994. It is expected that soil concentrations now, and 30 years hence, will be lower than those used to in the supplemental risk characterization presented herein.
- The fate-and-transport analysis was conducted using the J&E model, which includes the following conservative assumptions:
    1. The model is one-dimensional and unidirectional – as such, COPCs are transported from the source in the upward direction only (toward the potential receptor). Lateral deflection due to the presence of low permeability units or multi-dimensional diffusive transport is conservatively ignored. (Diffusion is, physically and mathematically, a three-dimensional process.)
    2. Degradation by any means is not included in the model. This is especially important for the fuel hydrocarbons (e.g., benzene, toluene, ethylbenzene, and xylenes).
    3. The model calculates a steady-state concentration, which inherently assumes that some portion of the mass with the source media will reach the receptor. This is particularly conservative when considering diffusive transport of vapors from ground water. Since ground water occurs at a depth of at least 85 feet bgs, it is likely that COPC vapors will not reach the receptors located at the ground surface.[19]

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[19] The time for "steady-state" to be achieved, using J&E model calculated parameters and a simple diffusive travel-time calculation (Eqn. 13 of the J&E NAPL-ADV and NAPL-SCREEN User's Guide) shows the travel

CONCLUSIONS

The BHRA was reviewed in light of proposed site development plans. Supplemental risk characterization using standard risk assessment methods[20,21,22,23,24] was conducted for three additional exposure scenarios not evaluated in the BHRA:

1. Indoor Worker (Adult)
2. Outdoor Worker (Adult Landscaper)
3. Trespasser (Child).

Upperbound incremental cancer risk and noncancer hazard index estimates for these receptors were shown to be within acceptable limit, *de minimis* levels, supporting the conclusion that the site poses no significant risk under the proposed development plan.

CLOSING

If you have any questions, Jim Van de Water can be reached at (949) 830-4542 (office); (949) 279-0525 (mobile); or (949) 317-0033 (pager). Teri Copeland can be reached at (818) 991-8240 (office).

Best regards,

Jim Van de Water

Jim Van de Water, C.HG.
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Jim Van de Water for:

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Cc: David Henry, RG, REA (Hazard Management Consulting, Inc., San Clemente, California)

Attachments (Tables 1 through 12)

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time for a relatively mobile vapor-phase COPC (benzene) from ground-water to be on the order of thousands of years. The travel time for benzene as reported herein for the landscaper and trespasser is greater than 100 years.

[20] USEPA, 1989. *Risk Assessment Guidance for Superfund (RAGS), Volume I Human Health Evaluation Manual (Part A)*, Office of Emergency and Remedial Response. December.

[21] USEPA, 1997a. *Exposure Factors Handbook*, Office of Research and Development. August.

[22] USEPA, 1997b. *HEAST (Health Effects Assessment Summary Table)*. Office of Research and Development.

[23] USEPA 2002. *Integrated Risk Information System (IRIS)*. Online database of USEPA toxicity criteria. (website: www.epa.gov/iris.html).

[24] California Environmental Protection Agency. 2001. Toxicity Criteria Database. Office of Environmental Health Hazard Assessment (OEHHA). http://www.oehha.ca.gov/risk/ChemicalDB/index.asp.

Table 1. Summary of HLA (1995) BHRA

(Future Occupational Receptor Exposure Scenario only; Risk and HI values based on RME Exposure Point Concentrations)

				Exposure Pathway ==>	Dermal		Ingestion		Inhalation		Particulates			
Soil Chemical of Concern	Detected in Surface Soil (0 to 1.5 feet)	Chemical Class	Release Source	Endpoint ==>	Cancer (Risk)	Noncancer (HI)	Cancer (Risk)	Noncancer (HI)	Cancer (Risk)	Noncancer (HI)	Cancer (Risk)	Noncancer (HI)		
Benzo(a)anthracene	Yes	PAHs[Note 1]	Impacted Soil		5.22E-10	4.23E-08	6.35E-11	5.15E-09	Not applicable	Not applicable	4.25E-13	1.00E-10		
Benzo(a)pyrene	Yes	PAHs	Impacted Soil		5.87E-09	4.76E-08	7.14E-10	5.80E-09	Not applicable	Not applicable	4.78E-12	1.20E-10		
Benzo(b)fluoranthene	Yes	PAHs	Impacted Soil		8.04E-10	6.53E-08	9.79E-11	7.95E-09	Not applicable	Not applicable	6.56E-13	1.60E-10		
Chrysene	Yes	PAHs	Impacted Soil		6.74E-11	5.47E-08	8.20E-12	6.86E-09	Not applicable	Not applicable	5.49E-14	1.30E-10		
Fluoranthene	Yes	PAHs	Impacted Soil		Non-carcinogen	5.16E-08	Non-carcinogen	6.28E-09	Not applicable	Not applicable	Non-carcinogen	1.30E-10		
Fluorene	No	PAHs	Impacted Soil		-	-	-	-	-	-	-	-		
2-Methyl Naphthalene	No	PAHs	Impacted Soil		-	-	-	-	-	-	-	-		
Naphthalene	No	PAHs	Impacted Soil		-	-	-	-	-	-	-	-		
Phenanthrene	Yes	PAHs	Impacted Soil		Non-carcinogen	3.53E-08	Non-carcinogen	4.30E-09	Not applicable	Not applicable	Non-carcinogen	8.60E-11		
Pyrene	Yes	PAHs	Impacted Soil		Non-carcinogen	9.88E-08	Non-carcinogen	1.20E-08	Not applicable	Not applicable	Non-carcinogen	2.40E-10		
Aroclor 1242	Yes	PCBs[Note 2]	Impacted Soil		1.94E-06	1.01E-02	2.19E-07	1.14E-03	Not applicable	Not applicable	4.38E-09	2.30E-05		
Aroclor 1248	Yes	PCBs	Impacted Soil		2.38E-06	1.23E-02	2.68E-07	1.39E-03	Not applicable	Not applicable	5.37E-09	2.80E-05		
Aroclor 1254	Yes	PCBs	Impacted Soil		3.13E-06	1.63E-02	3.54E-07	1.84E-03	Not applicable	Not applicable	7.08E-09	3.70E-05		
Aroclor 1260	Yes	PCBs	Impacted Soil		6.03E-07	3.13E-03	6.81E-08	3.54E-04	Not applicable	Not applicable	1.36E-09	7.10E-06		
cis-1,2-Dichloroethene (c-1,2-DCE)	No	VOCs[Note 3]	Impacted Soil		Not applicable	Not applicable	Not applicable	Not applicable	Non-carcinogen	6.69E-04	Not applicable	Not applicable		
1,1-Dichloroethane (1,1-DCA)	No	VOCs	Impacted Soil		Not applicable	Not applicable	Not applicable	Not applicable	Non-carcinogen	3.90E-05	Not applicable	Not applicable		
Ethylbenzene	No	VOCs	Impacted Soil		Not applicable	Not applicable	Not applicable	Not applicable	Non-carcinogen	2.47E-05	Not applicable	Not applicable		
Methylene Chloride	No	VOCs	Impacted Soil		Not applicable	Not applicable	Not applicable	Not applicable	6.13E-09	8.17E-05	Not applicable	Not applicable		
Tetrachloroethene (PCE)	No	VOCs	Impacted Soil		Not applicable	Not applicable	Not applicable	Not applicable	2.83E-07	1.55E-03	Not applicable	Not applicable		
Trichloroethene (TCE)	No	VOCs	Impacted Soil		Not applicable	Not applicable	Not applicable	Not applicable	3.23E-08	1.51E-03	Not applicable	Not applicable		
Barium	Yes	Metals	Impacted Soil		Non-carcinogen	1.78E-03	Non-carcinogen	2.82E-03	Not applicable	Not applicable	Non-carcinogen	5.60E-05		
Lead	Yes	Metals	Impacted Soil		"LEADSPREAD"	"LEADSPREAD"	"LEADSPREAD"	"LEADSPREAD"	"LEADSPREAD"	"LEADSPREAD"	"LEADSPREAD"	"LEADSPREAD"		
2,4-Dimethylphenol	No	Phenols	Impacted Soil		-	-	-	-	-	-	-	-		
4-Methylphenol	Yes	Phenols	Impacted Soil		Non-carcinogen	9.02E-05	Non-carcinogen	1.43E-05	Not applicable	Not applicable	Non-carcinogen	2.90E-07		
Phenol	Yes	Phenols	Impacted Soil		Non-carcinogen	4.42E-06	Non-carcinogen	6.99E-07	Not applicable	Not applicable	Non-carcinogen	1.40E-08		
n-Nitrosodi-N-propylamine	No	Nitrosamines	Impacted Soil		-	-	-	-	-	-	-	-		
n-Nitrosodiphenylamine	No	Nitrosamines	Impacted Soil		-	-	-	-	-	-	-	-		
bis(2-ethylhexyl)phthalate	Yes	Phthalates	Impacted Soil		1.92E-08	4.47E-04	3.03E-09	5.05E-05	Not applicable	Not applicable	6.06E-11	1.00E-06		
				Cancer Risk ==>	8E-06	-	9E-07	-	3E-07	-	2E-08	-	9E-06	<== Total Cancer Risk (all COPCs)
				Hazard Index ==>	-	4E-02	-	8E-03	-	4E-03	-	2E-04	6E-02	<== Total Hazard Index (all COPCs)
				"Non-PCB" Cancer Risk ==>	3E-08	-	4E-09	-	3E-07	-	7E-11	-	4E-07	<== Total "Non-PCB" Cancer Risk
				"Non-PCB" Hazard Index ==>	-	2E-03	-	3E-03	-	4E-03	-	6E-05	9E-03	<== Total "Non-PCB" Hazard Index

Note 1: Polynuclear aromatic hydrocarbons.
Note 2: Polychlorinated biphenyls.
Note 3: Volatile organic compounds.

Table 2. Maximum Detected Concentrations of VOCs in Ground Water

Source: BHRA (HLA 1995 RI, Volume I), Table 15 and CENCO/Versar, Inc. (March 2002)[Note 1]

All concentrations in micrograms per liter

Boring	Status	Location	1,1,1-TCA	1,1-DCA	PCE	TCE	Vinyl Chloride	c-1,2-DCE	t-1,2-DCE	Acetone	Methylene Chloride	MEK	Benzene	Ethylbenzene	Toluene	Xylenes
W-1	-	Lakeland section	-	8.4	-	-	26	76	-	100	15	-	660	69	12	58
W-2	Abandoned	Between Lakeland and Railroad sections	-	4.3	-	-	75	100	21	66	2.6	-	180	12	26	5
W-3	Abandoned	Powerine section	-	6	-	-	51	5.8	-	-	-	-	590	7.6	4.5	13
W-3A	-	Powerine section	-	-	-	-	7	-	-	-	-	-	220	35	-	3.1
W-4	-	Lakeland section	-	12	-	-	44	8.6	1.2	-	-	-	320	4.8	5.4	3.3
W-5	Unknown[Note 2]	Unknown[Note 2]	-	3.6	-	-	5.8	98	21	-	1.5	-	140	11	-	-
EW-1	-	NE corner (Railroad section)	-	-	-	-	29	28	31	180	-	-	1800	1800	300	2000
Maximum Concentration (excluding EW-1)===>			**-**	**12**	**-**	**-**	**75**	**100**	**21**	**100**	**15**	**-**	**660**	**69**	**26**	**58**

Note 1: Via facsimile from CENCO to Hazard Management Consulting, Inc. on March 5, 2002.

Table 3. Detections of VOCs in Soil

Source: BHRA (HLA 1995 RI, Volume IV), Tables 5 and 14c

All concentrations in milligrams per kilogram

Concentrations (maximums) used in J&E model for Indoor Worker highlighted in yellow

Gray-shaded values in either the PCB cap area or the NE corner of Railroad section and not considered as input for Indoor Worker risk calculations

Boring	Depth	Location	1,1,1-TCA	TCA (isomer not specified)	1,1-DCA	PCE	TCE	Vinyl Chloride	c-1,2-DCE	t-1,2-DCE	Acetone	Methylene Chloride	MEK	Benzene	Ethylbenzene	Toluene	Xylenes
TW-17	15	E of Lakewood section	-	-	-	-	-	-	-	-	-	-	-	-	0.88	-	5.3
TSB-6	10	Lakewood section	-	-	-	-	-	-	-	-	-	-	-	0.14	22	4.4	120
TSB-6	30	Lakewood section	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TW-4	5	Lakewood section	-	-	-	-	-	-	-	-	-	-	-	-	-	0.15	-
TW-4	15	Lakewood section	-	-	-	-	-	-	-	-	-	-	-	-	0.88	-	5.3
7B	2-3.5	Lakewood section / PCB cap area	9.7	32	4.4	12	-	-	-	-	-	-	-	-	5.5	62	44
LS-03	5	Lakewood section / PCB cap area	-	-	0.019	0.11	0.14	-	0.031	-	-	-	-	-	0.022	-	-
LS-03	10.5	Lakewood section / PCB cap area	-	-	-	-	-	-	0.011	-	-	-	-	-	-	-	-
LS-03	11	Lakewood section / PCB cap area	-	-	0.0082	-	-	-	0.028	-	-	-	-	-	-	-	-
LS-03	15.5	Lakewood section / PCB cap area	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS-03	20.5	Lakewood section / PCB cap area	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS-03	25.5	Lakewood section / PCB cap area	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS-03	26.5	Lakewood section / PCB cap area	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS-03	30.5	Lakewood section / PCB cap area	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS-04	5.5	Lakewood section / PCB cap area	-	-	0.006	-	0.022	-	0.0083	-	-	-	-	-	-	-	-
LS-04	10.5	Lakewood section / PCB cap area	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS-04	11	Lakewood section / PCB cap area	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS-04	15.5	Lakewood section / PCB cap area	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS-04	20.5	Lakewood section / PCB cap area	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS-04	25.5	Lakewood section / PCB cap area	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS-04	31	Lakewood section / PCB cap area	-	-	0.0065	-	-	-	-	-	-	-	-	-	-	-	-
E-1	10	NE corner (Railroad section)	-	-	-	-	-	-	-	-	-	-	-	-	0.12	0.44	0.62
E-1	30	NE corner (Railroad section)	-	-	-	-	-	-	-	-	-	-	-	-	5.2	0.33	4.12
E-1	70	NE corner (Railroad section)	-	-	-	-	-	-	-	-	-	-	-	1.26	0.35	0.1	0.66
E-1	80	NE corner (Railroad section)	-	-	-	-	-	-	-	-	-	-	-	-	64.6	12.5	30.7
E-1	90	NE corner (Railroad section)	-	-	-	-	-	-	-	-	-	-	-	3.84	26.5	6.25	15.2
E-1	95	NE corner (Railroad section)	-	-	-	-	-	-	-	-	-	-	-	5.44	36.6	8.68	21.5
RS-01	1	NE corner (Railroad section)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RS-01	8.5	NE corner (Railroad section)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RS-01	19	NE corner (Railroad section)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RS-01	19.5	NE corner (Railroad section)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RS-01	29.5	NE corner (Railroad section)	-	-	-	-	-	-	-	-	-	-	-	-	2.3	-	-

Table 3. Detections of VOCs in Soil

Source: BHRA (HLA 1995 RI, Volume IV), Tables 5 and 14c

All concentrations in milligrams per kilogram

Concentrations (maximums) used in J&E model for Indoor Worker highlighted in yellow

Gray-shaded values in either the PCB cap area or the NE corner of Railroad section and not considered as input for Indoor Worker risk calculations

Boring	Depth	Location	1,1,1-TCA	TCA (isomer not specified)	1,1-DCA	PCE	TCE	Vinyl Chloride	c-1,2-DCE	t-1,2-DCE	Acetone	Methylene Chloride	MEK	Benzene	Ethylbenzene	Toluene	Xylenes
RS-01	39.5	NE corner (Railroad section)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RS-01	49	NE corner (Railroad section)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RS-01	59	NE corner (Railroad section)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RS-01	69	NE corner (Railroad section)	-	-	-	-	-	-	-	-	-	-	-	0.0065	0.049	-	-
RS-01	69.5	NE corner (Railroad section)	-	-	-	-	-	-	-	-	-	-	-	0.13	-	0.092	0.051
RS-01	79	NE corner (Railroad section)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RS-01	79.5	NE corner (Railroad section)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RS-01	89	NE corner (Railroad section)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RS-03	5.5	Railroad section	-	-	-	-	-	-	-	-	0.14	-	0.032	-	-	-	-
RS-03	11	Railroad section	-	-	-	-	-	-	-	-	-	0.0055B	-	-	-	-	-
RS-03	16	Railroad section	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RS-03	20	Railroad section	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RS-09	5	Railroad section	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RS-09	5.5	Railroad section	-	-	-	-	-	-	-	-	-	0.085	-	-	-	-	-
RS-09	10	Railroad section	-	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-
RS-10	5	Railroad section	-	-	-	-	-	-	-	-	-	0.11	-	-	-	-	-
RS-10	16	Railroad section	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RS-11	5	Railroad section	-	-	-	-	-	-	-	-	-	0.18	-	-	-	-	-
RS-11	10	Railroad section	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RS-11	10.5	Railroad section	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5A	3.50	W of Railroad section	-	-	-	-	-	-	-	-	-	-	-	-	-	0.64	-
5A	3.5-6.0	W of Railroad section	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5B	2.50	W of Railroad section	-	-	-	-	-	-	-	-	-	-	-	-	-	0.49	-
5B	2.5-4.0	W of Railroad section	0.07	0.25	-	0.11	-	-	-	-	-	-	-	-	-	-	-
RS-02	1	W of Railroad section	-	-	-	-	-	-	-	-	-	0.0079B	-	-	-	-	-
RS-02	5.5	W of Railroad section	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RS-02	6	W of Railroad section	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RS-02	10.5	W of Railroad section	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RS-02	16	W of Railroad section	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RS-02	20	W of Railroad section	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 4. Summary of BTEX Concentrations in Soil for the NE Corner/Railroad Section

(Bolded values are calculated)

Depth	Benzene	Toluene	Ethylbenzene	Total Xylenes
10	0.05	0.44	0.12	0.62
30	0.13	0.33	5.2	4.12
70	1.26	0.10	0.35	0.66
80	11.5	12.5	64.6	30.7
90	3.84	6.25	26.5	15.2
95	5.44	8.68	36.6	21.5

Thickness-averaged BTEX concentrations (Concentrations used in J&E model)

Assumes top 10 feet will be graded back (removed) as part of site development and 10 to 30 feet is clean
(based on concentrations, depth of wet gas line, and offset of wet gas line from northern property boundary)

Therefore, depth to top of contamination is: 20 feet

Each gray-shaded value below is the average of the top and bottom concentrations (from the table above) multiplied by the distance between them.

Top	Bottom	Benzene	Toluene	Ethylbenzene	Total Xylenes
30	**70**	**27.800**	**8.600**	**111.000**	**95.600**
70	**80**	**63.800**	**63.000**	**324.750**	**156.800**
80	**90**	**76.700**	**93.750**	**455.500**	**229.500**
90	**95**	**23.200**	**37.325**	**157.750**	**91.750**
95	**95**	**0.000**	**0.000**	**0.000**	**0.000**
Total Impacted Thickness ==>	**65**	**2.9**	**3.1**	**16.1**	**8.8**

Thickness-averaged Benzene concentration used in model

Thickness-averaged Toluene concentration used in model

Thickness-averaged Ethylbenzene concentration used in model

Thickness-averaged Total Xylenes concentration used in model

Table 5. "DATAENTER" Worksheet - Indoor Air EPC (Flux from Ground Water)

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

GW-ADV
Version 2.3; 03/01

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
71432	6.60E+02	Benzene

MORE ↓

ENTER Average soil/groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm²)
			Totals must add up to value of L_{WT} (cell D28)							
17.96	15	2590.8	1219.2	1371.6	0	B	S	SIL		

MORE ↓

ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm³)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm³/cm³)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm³)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm³/cm³)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm³)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm³/cm³)
1.69	0.38	0.34	1.61	0.41	0.24	0	0	0

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s²)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)
15	40	3995.09	3995.09	243.84	0.1	0.45

Table 6. "DATAENTER" Worksheet - Indoor Air EPC (Flux from Soil)

SL-ADV
Version 2.3; 03/01

CALCULATE RISK-BASED SOIL CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL SOIL CONCENTRATION (enter "X" in "YES" box and initial soil conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial soil conc., C_R (µg/kg)	Chemical
71432	1.40E+02	Benzene

MORE ↓

ENTER Average soil temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to top of contamination, L_t (cm)	ENTER Depth below grade to bottom of contamination, (enter value of 0 if value is unknown) L_b (cm)	ENTER (Totals must add up to value of L_t (cell D28)) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm²)
17.96	15	15	2590.8	15	0	0	SIL		

MORE ↓

ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm³)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm³/cm³)	ENTER Stratum A soil organic carbon fraction, f_{oc}^A (unitless)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm³)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm³/cm³)	ENTER Stratum B soil organic carbon fraction, f_{oc}^B (unitless)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm³)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm³/cm³)	ENTER Stratum C soil organic carbon fraction, f_{oc}^C (unitless)
1.61	0.411	0.242	0.0013								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s²)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)
15	40	3995.1	3995.1	243.8	0.1	0.45

Table 7. "DATAENTER" Worksheet for Calculation of Outdoor Air EPC

(Landscaper and Trespasser in Northeastern Corner of Railroad Section)

NAPL-ADV Ver. 1.6 (12/00)
Requires the SOLVER Add-in.

	ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial soil concentration, C_R (mg/kg)	Clear Data Entry Sheet	Chemical	Execute Model	Time-averaged outdoor concentration ($\mu g/m^3$)	Incremental cancer risk (unitless)	Route-to-route extrap. (X)	Hazard quotient (unitless)	Route-to-route extrap. (X)
1.	71432	2.9		Benzene		4.93E-03				
2.	108883	3.1		Toluene		1.55E-03				
3.	100414	16.1		Ethylbenzene		2.37E-03				
4.	95476	8.8		o-Xylene		1.24E-03				
5.										
6.										
7.										
8.										
9.										
10.										

TIME-STEP PARAMETERS

ENTER Initial time-step, δt (days)	ENTER Maximum change in mass, ΔM_t^{max} (%)	ENTER Minimum change in mass, ΔM_t^{min} (%)
2	8	5

MORE ↓

MORE →

ENTER Depth to top of contamination, L_t (cm)	ENTER Width of contamination, W_C (cm)	ENTER Length of contamination, L_C (cm)	ENTER Thickness of contamination, H_C (cm)	ENTER Average soil temperature, T_S (°C)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C (Enter value or 0) h_C (cm)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm²)
609.6	1524	1524	1981.2	17.96	152.4	457.2	0	SIL		

Totals must add up to value of L_t (cell C30)

MORE ↓

MORE →

ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm³)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm³/cm³)	ENTER Stratum A soil organic carbon fraction, f_{oc}^A (unitless)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm³)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm³/cm³)	ENTER Stratum B soil organic carbon fraction, f_{oc}^B (unitless)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm³)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm³/cm³)	ENTER Stratum C soil organic carbon fraction, f_{oc}^C (unitless)
1.69	0.38	0.34	0.0034	1.61	0.41	0.24	0.0013				

MORE ↓

ENTER Outdoor space length, L_B (cm)	ENTER Outdoor space width, W_B (cm)	ENTER Outdoor space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)
1524	1524	200	[illegible]	[illegible]
			Goal Seek	Goal Seek

MORE ↓

2.25	m/s	Wind speed
225	cm/s	[illegible]
[illegible]	cm²/s	[illegible]
[illegible]	cm²/s	[illegible]
1.00E+00	unitless	Set this value equal to 1 by adjusting ER

END

Crack frac. => 1.00E+00 Set this equal to 1 by adjusting the seam-crack width

Table 8. Cancer Risk from Inhalation of Vapors from Chemicals in Ground Water and Soil for Indoor Worker

		(C_{air} [Note 1]	* IR	* ET	* EF	* ED	)/(BW	* AT	)= LADD	* CSFi [Note 2]		Risk
COPC	Release Source	mg/m^3	(m^3/hour)	(hours/day)	(days/year)	(yrs)	(kg)	(days)	(mg/kg/day)	$(mg/kg\text{-}day)^{-1}$	=	(unitless)
1,1-DCA	Ground Water	1.27E-08	1.5	8	250	25	70	25550	5.31E-10	5.70E-03		3.03E-12
Vinyl Chloride	Ground Water	3.74E-07	1.5	8	250	25	70	25550	1.57E-08	2.70E-01		4.23E-09
Methylene Chloride	Ground Water	1.20E-08	1.5	8	250	25	70	25550	5.02E-10	3.50E-03		1.76E-12
Benzene	Ground Water	7.21E-07	1.5	8	250	25	70	25550	3.02E-08	1.00E-01		3.02E-09
PCE	Soil	3.65E-05	1.5	8	250	25	70	25550	1.53E-06	2.10E-02		3.22E-08
Methylene Chloride	Soil	2.58E-05	1.5	8	250	25	70	25550	1.08E-06	3.50E-03		3.79E-09
Benzene	Soil	3.01E-05	1.5	8	250	25	70	25550	1.26E-06	1.00E-01		1.26E-07

Total Risk ==> 2E-07

Note 1: As calculated by the J&E model.
Note 2: From OEHHA (Cal/EPA) on-line database.

Additional Notes

Risks and Hazard Indices associated with ground water as the release source are based on maximum hit detected in (regardless of when the maximum hit was measured) all wells except EW-1 (the NE corner/Railroad section), as shown in Table 3.

Risks and Hazard Indices associated with soil as the release source are based on maximum hit, *which are conservatively assumed to extend from the base of the slab (essentially, the ground surface) to the water table.*

Risks and Hazard Indices are conservatively based on a building (slab) area of the smallest building contemplated as shown on Thienes Engineering Sheet 1 (last updated 3/5/02) assuming 20 percent will be used as office space. Ceiling height assumed to be 8 feet.

Soil concentrations in the NE corner/Railroad section are calculated separately as this area is isolated and there are no indoor receptors (i.e., landscaper and trespassers only).

Table 9. Hazard Index from Inhalation of Vapors from Chemicals in Ground Water and Soil for Indoor Worker

		($C_{building}$[Note 1] *	IR *	ET *	EF *	ED)/(	BW *	AT)=	ADD /	RfD[Note 2] =	Hazard Index
COPC	Release Source	mg/m^3	(m^3/hour)	(hours/day)	(days/year)	(yrs)	(kg)	(days)	(mg/kg/day)	(mg/kg/day)	(unitless)
1,1-DCA	Ground Water	1.27E-08	1.5	8	250	25	70	9125	1.49E-09	1.40E-01	1.06E-08
c-1,2-DCE	Ground Water	9.07E-08	1.5	8	250	25	70	9125	1.07E-08	1.00E-02	1.07E-06
t-1,2-DCE	Ground Water	3.17E-08	1.5	8	250	25	70	9125	3.72E-09	2.00E-02	1.86E-07
Acetone	Ground Water	4.70E-08	1.5	8	250	25	70	9125	5.52E-09	1.00E-01	5.52E-08
Methylene Chloride	Ground Water	1.20E-08	1.5	8	250	25	70	9125	1.40E-09	1.14E-01	1.23E-08
Benzene	Ground Water	7.21E-07	1.5	8	250	25	70	9125	8.47E-08	1.70E-02	4.98E-06
Ethylbenzene	Ground Water	7.69E-08	1.5	8	250	25	70	9125	9.03E-09	5.70E-01	1.58E-08
Toluene	Ground Water	2.95E-08	1.5	8	250	25	70	9125	3.47E-09	8.60E-02	4.03E-08
Xylenes[Note 3]	Ground Water	6.30E-08	1.5	8	250	25	70	9125	7.40E-09	2.00E-01	3.70E-08
1,1,1-TCA	Soil	1.05E-04	1.5	8	250	25	70	9125	1.23E-05	2.90E-01	4.24E-05
PCE	Soil	3.65E-05	1.5	8	250	25	70	9125	4.29E-06	1.10E-01	3.90E-05
Acetone	Soil	6.06E-07	1.5	8	250	25	70	9125	7.12E-08	1.00E-01	7.12E-07
Methylene Chloride	Soil	2.58E-05	1.5	8	250	25	70	9125	3.03E-06	1.14E-01	2.66E-05
MEK	Soil	2.41E-07	1.5	8	250	25	70	9125	2.83E-08	2.90E-01	9.75E-08
Benzene	Soil	3.01E-05	1.5	8	250	25	70	9125	3.54E-06	1.70E-02	2.08E-04
Ethylbenzene	Soil	2.02E-03	1.5	8	250	25	70	9125	2.37E-04	5.70E-01	4.16E-04
Toluene	Soil	6.47E-04	1.5	8	250	25	70	9125	7.60E-05	8.60E-02	8.83E-04
Xylenes[Note 3]	Soil	9.84E-03	1.5	8	250	25	70	9125	1.16E-03	2.00E-01	5.78E-03

Total Hazard Index ==> 7E-03

Note 1: As calculated by the J&E model.
Note 2: Values assigned based on the following hierarchy: (1) OEHHA (Cal/EPA) on-line database, (2) USEPA IRIS on-line database, (3) HEAST, (4) where necessary, route extrapolation employed consistent with USEPA Region IX PRGs.
Note 3: Conservatively based on *p*-Xylene fate-and-transport parameters. RfD based on "total xylenes".

Additional Notes

Risks and Hazard Indices associated with ground water as the release source are based on maximum hit detected in (regardless of when the maximum hit was measured) all wells except EW-1 (the NE corner/Railroad section), as shown in Table 3.

Risks and Hazard Indices associated with soil as the release source are based on maximum hit, *which are conservatively assumed to extend from the base of the slab (essentially, the ground surface) to the water table.*

Risks and Hazard Indices are conservatively based on a building (slab) area of the smallest building contemplated as shown on Thienes Engineering Sheet 1 (last updated 3/5/02) assuming 20 percent will be used as office space. Ceiling height assumed to be 8 feet.

Soil concentrations in the NE corner/Railroad section are calculated separately as this area is isolated and there are no indoor receptors (i.e., landscaper and trespassers only).

Table 10. Cancer Risk from Inhalation of Vapors from Chemicals in Soil for Landscaper and Trespasser

Landscaper

		(C_{air} [Note 1] *	IR *	ET *	EF *	ED)/(	BW *	AT)=	LADD *	CSFi [Note 2] =	Risk
COPC	Release Source	mg/m^3	(m^3/hour)	(hours/day)	(days/year)	(yrs)	(kg)	(days)	(mg/kg/day)	(mg/kg-day)$^{-1}$	(unitless)
Benzene	Soil	4.93E-06	1.5	8	250	25	70	25550	2.07E-07	1.00E-01	2.07E-08
										Total Risk ==>	2E-08

Trespasser

		(C_{air} [Note 1] *	IR *	ET *	EF *	ED)/(	BW *	AT)=	LADD *	CSFi [Note 2] =	Risk
COPC	Release Source	mg/m^3	(m^3/hour)	(hours/day)	(days/year)	(yrs)	(kg)	(days)	(mg/kg/day)	(mg/kg-day)$^{-1}$	(unitless)
Benzene	Soil	4.93E-06	0.33	4	100	5	15	25550	8.57E-09	1.00E-01	8.57E-10
										Total Risk ==>	9E-10

Note 1: As calculated by the J&E model.
Note 2: From OEHHA (Cal/EPA) on-line database.

Table 11. Hazard Index from Inhalation of Vapors from Chemicals in Soil for Landscaper and Trespasser

Landscaper

COPC	Release Source	(C_{air}[Note 1] mg/m^3	* IR (m³/hour)	* ET (hours/day)	* EF (days/year)	* ED (yrs)	)/(BW (kg)	* AT (days)	)= ADD (mg/kg/day)	/ RfD[Note 3] (mg/kg-day)	= Hazard Index (unitless)
Benzene	Soil	4.93E-06	1.5	8	250	25	70	9125	5.78E-07	1.70E-02	3.40E-05
Ethylbenzene	Soil	2.37E-06	1.5	8	250	25	70	9125	2.78E-07	5.70E-01	4.87E-07
Toluene	Soil	1.55E-06	1.5	8	250	25	70	9125	1.82E-07	8.60E-02	2.12E-06
Xylenes[Note 2]	Soil	1.24E-06	1.5	8	250	25	70	9125	1.46E-07	2.00E-01	7.29E-07
										Total Hazard Index ==>	4E-05

Trespasser

COPC	Release Source	(C_{air}[Note 1] mg/m^3	* IR (m³/hour)	* ET (hours/day)	* EF (days/year)	* ED (yrs)	)/(BW (kg)	* AT (days)	)= ADD (mg/kg/day)	/ RfD[Note 3] (mg/kg-day)	= Hazard Index (unitless)
Benzene	Soil	4.93E-06	0.33	4	100	5	15	1825	1.20E-07	1.70E-02	7.06E-06
Ethylbenzene	Soil	2.37E-06	0.33	4	100	5	15	1825	5.76E-08	5.70E-01	1.01E-07
Toluene	Soil	1.55E-06	0.33	4	100	5	15	1825	3.78E-08	8.60E-02	4.40E-07
Xylenes[Note 2]	Soil	1.24E-06	0.33	4	100	5	15	1825	3.03E-08	2.00E-01	1.51E-07
										Total Hazard Index ==>	8E-06

Note 1: As calculated by the J&E model.

Note 2: Conservatively based on *o*-Xylene fate-and-transport parameters. RfD based on "total Xylenes".

Note 3: From OEHHA (Cal/EPA) on-line database.

Table 12. Summary of Cancer Risks and Hazard Indices

Receptor	Cancer Risk (unitless)	Hazard Index (unitless)
Indoor Worker	2E-07	7E-03
Outdoor Worker (Landscaper in northeastern corner of the Railroad Section)	2E-08	4E-05
Trespasser (Child in northeastern corner of the Railroad Section)	9E-10	8E-06

Santa Fe Springs Fire Department

11300 Greenstone Ave., Santa Fe Springs, CA 90670
562.944.9715 Fax 562.941.1817

Fax

To: PETER RECWEY
From: Tom Hall

Fax: 949 · 724 · 5196
Pages: 3

Phone:
Date: ~~4/16/02~~ 4/18/02

Re: DE MINIMUS FINDING LETTER

Urgent ☐ For Review ☐ Please Comment ☐ Please Reply ☐ Recycle ☐

Comments:

PETER:

HERE IT IS. HOPE IT HELPS

– Tom

SORRY ABOUT THE POST-IT NOTE.

Department of
Toxic Substances
Control

1011 N. Grandview Avenue
Glendale, CA 91201

Pete Wilson
Governor

James M. Strock
Secretary for
Environmental
Protection

DE MINIMUS IMPACT FINDING

for

DRAFT NEGATIVE DECLARATION
FOR THE DRAFT REMEDIAL ACTION PLAN AT THE WALKER PROPERTY SITE

Project Proponent:

California Environmental Protection Agency
Department of Toxic Substances Control
1011 N. Grandview Avenue
Glendale, California 91201

Contact: Mr. Richard Gebert at (818) 551-2859

Project Description: The Walker Property Site (Site) is located at the southeastern corner of Bloomfield Avenue and Lakeland Road in Santa Fe Springs, California, in the County of Los Angeles. The Site is currently unoccupied, except for the Balboa Pacific Corporation which designs and constructs industrial wastewater treatment systems. Past uses of the Site include the storage of crude oil, refined product and waste oil, and storage/disposal of oil-well drilling fluids.

Ninety exploratory borings were drilled; six groundwater and sixteen soil-gas monitoring wells were installed; soil samples were collected and analyzed; and three asbestos samples were taken from surface facilities to determine the vertical and horizontal extent of contaminates on-site. Polychlorinated biphenyls (PCBs), lead, barium, petroleum hydrocarbons, and asbestos were detected in soils on-site. Volatile organic compounds (VOCs) were detected occasionally at very low concentrations.

Past remedial activities on-site were conducted between May 1993 and March 1994 and included drum removal, above ground tank cleaning and water disposal, decommissioning and removal, and the removal of asbestos containing materials and asbestos-impacted soils. Because of the negligible risks associated with the lead, barium, VOCs and petroleum hydrocarbons detected on-site no further actions are required for the chemicals of concern.

The Draft Remedial Action Plan provides for the remediation of soils containing PCBs at the Site. PCBs have been released into on-site soils and pose a potential risk to human health and the environment. Surface transport of PCB containing soils may have the potential to affect offsite surface waters. Groundwater samples from on-site monitoring wells contained petroleum hydrocarbons and VOCs. Groundwater does not appear to have been impacted by Site activity. The impaired groundwater quality is the result of known upgradient and crossgradient sources.

The proposed project will reduce the potential migration of PCBs in the Site soils through the installation of a cap. Soils containing PCBs will be capped to minimize surface transport and surface water filtration. The cap will consist of a buffer layer of soil placed over the impacted soils, a base layer of crushed concrete or rock over the buffer layer, and a pavement layer over the base layer. The finished surface is sloped similar to a parking lot to provide adequate run off without causing significant soil erosion. The capped area of the Site will be subject to a covenant to future use. The covenant will be recorded after certification by the Department of Toxic Substances Control (DTSC) that implementation of the RAP has been completed.

The remedial action will protect human health and the environment and complies with Federal and State requirements. The remedy uses a permanent solution to the maximum extent practicable to ensure that there will be no further environmental degradation.

Special Initial Study Information: The Special Initial Study has been conducted by DTSC to evaluate the possibility of significant effect. The Special Initial Study is attached.

Declaration of No Evidence of Potential Adverse Effect: When considering the Initial Study and the record, there is no evidence before DTSC that the proposed project will have potential for an adverse effect on wildlife resources or the habitat upon which the wildlife depends.

Declaration of Rebutment of Presumption: DTSC has, on the basis of substantial evidence, rebutted the presumption of adverse effect contained in Section 753.5(d), Title 14 of the California Code of Regulations.

Certification: The Department of Toxic Substances Control certifies that it, as lead agency, has made the above findings of fact and that based upon the initial study and upon the record, the project will not individually or cumulatively have an adverse effect on wildlife resources, as defined in Section 711.2 of the Fish and Game Code. Signature verifying this certification is attached.

Signature Richard Gebert Date 4/21/97
Project Manager

Signature [signature] Date 4/21/97
Branch Chief

FYI
copies are
filed

City of Santa Fe Springs

Headquarters Fire Station

11300 Greenstone Ave. • CA • 90670-4619 • (562) 944-9713 • Fax (562) 941-1817 • www.santafesprings.org

April 11, 2002

Bloomfield Partners, LLC
c/o Peter M. Rooney
Sares-Regis Group
18802 Bardeen Avenue
Irvine, CA 92612-1521

Re: Soil Management Plan, Former Walker Property, Santa Fe Springs, California

Gentlemen:

The Santa Fe Springs Fire Department (SFSFD) is the local Certified Unified Program Agency that has been certified by the California Environmental Protection Agency (Cal/EPA) to implement the six state environmental programs within our jurisdiction. The SFSFD has jurisdiction over soil related issues, underground storage tank removal, clarifier removal and petroleum pipeline removal. To help facilitate new developments in the City of Santa Fe Springs, the SFSFD has developed draft "Soil Screening Guidelines and Site Mitigation Procedures for Industrial Sites" that are used as general guidelines for establishing testing and cleanup requirements. The SFSFD has also developed "Pipeline Abandonment Procedures" that are used as general guidelines in connection with pipeline abandonment and removals in the City.

In light of the amount of information known about the former Walker Property (Site), and the issuance of a De Minimus Impact Finder letter by the Department of Toxic Substances Control (DTSC) on April 21, 1997, Ninyo & Moore, the environmental consultants you have retained to assist you in developing a grading plan for the Site, have recommended that the SFSFD modify its general soil cleanup requirements for total petroleum hydrocarbons (TPH) and pipeline abandonment and removal procedures for the Site. The recommendations of your consultant have been set forth in a Soil Management Plan (SMP) that has been specifically developed for the Site.

The SFSFD reviewed the initial draft of the SMP and provided comments to Bloomfield Partners, LLC (Bloomfield) for consideration. The SFSFD and Bloomfield have worked together over the past several weeks developing protocols that are appropriate for the Site. The SFSFD has reviewed the final version of the SMP, which was dated April 4, 2002, and hereby approves the SMP. By approving the SMP, the SFSFD accepts the protocols set forth in Section 5 of the SMP as the appropriate guidelines to be used and followed in connection with the development of the Site. The SFSFD's approval of this SMP acknowledges the modification of the SFSFD's TPH soil cleanup levels for the Site and the modification of the SFSFD's general "Pipeline Abandonment Procedures" for the Site.

We look forward to working with you in connection with your development of the Site. If you have any questions, please call me.

Sincerely,

Neal Welland

Neal Welland
Fire Chief

NW/dk/bc

cc: Fred Latham, City Manager
Robert Orpin, Director of Planning and Development

Bruce C. Bearer
Senior Vice President - Development
Commercial Development Division

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24951 Grissom Circle • Laguna Hills, California 92653

Ninyo & Moore

Geotechnical & Environmental Sciences Consultants

- Geotechnical Engineering
- Environmental Assessment
- Regulatory Compliance
- Materials Testing
- Hydrogeology
- Geology

Paul A. Roberts, RG
Senior Environmental Geologist

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949.279.0525 (Mobile)

May 22, 2002

Mr. Tom Hall
City of Santa Fe Springs Fire Department
11300 Greenstone Avenue
Santa Fe Springs, California 90670

Subject: Review of DTSC-Approved "Baseline Health Risk Assessment" and Supplemental Risk Calculations, Walker Property, Santa Fe Springs, California

Dear Mr. Hall,

Please find enclosed a copy of the Review of DTSC-Approved "Baseline Health Risk Assessment" and Supplemental Risk Calculations, Walker Property, Santa Fe Springs, California, prepared by Jim Van de Water and Teri L. Copland dated March 26, 2002.

The California Environmental Protection Agency Department of Health Services (DOHS) approved the Baseline Health Risk Assessment (HRA) for the Walker Property (Volume IV of Harding Lawson Associates, 1995). This HRA was reviewed and supplemental risk calculations incorporating all of the currently available chemical data have been performed. This supplemental evaluation included the inhalation of volatile organic compound vapors derived from the fuel type hydrocarbons (TPHg, TPHd) and purgeable aromatic hydrocarbons (BTEX) by a future adult outdoor worker (landscaper) and a future outdoor child trespasser. The upperbound incremental cancer risk (2E-08 and 9E-10 respectively) and hazard index estimates (4E-05 and 8E-06 respectively) for these receptors were shown to be within acceptable limits (1E-04 to 1E-06 for cancer risk and 1E+00 for hazard index) and supports the conclusion that the hydrocarbon compounds detected in the soil at the northeast corner of the property poses no significant risk to a future adult outdoor worker (landscaper) or a future outdoor child trespasser.

Pedestrians or passersby were not specifically quantitatively evaluated. However, due to their low exposure time, the potential risks and hazard indices associated with these types of receptors would be less than those for the landscaper or child trespasser, and therefore would pose no significant health risk for pedestrians or passersby.

If you have any questions or need additional information, please feel free to contact me at my direct number (949) 587-0340. I can also be reached by mobile phone at (714) 328-2789, paged at (949) 588-5219, or by e-mail at DaveH@HMCInc.Biz.

Very truly yours,
Hazard Management Consulting, Inc.

David M. Henry, R.G.
Associate

cc: Mr. Peter Rooney, Sares-Regis Group

Hall, Tom

From: Hall, Tom
Sent: Tuesday, June 04, 2002 3:07 PM
To: Welland, Neal; Klunk, Dave; 'GibertlLee@santafesprings.org'; Andy Lazzaretto (E-mail)
Cc: 'FredLatham@santafesprings.org'; 'BobOrpin@santafesprings.org'
Subject: Review of Walker Property Supplemental Risk Assessment

Attached is a review of the DTSC Health Risk Assessment/Supplemental Risk Calculation provided to our department from Saris-Regis. Our department ask for this information during a meeting in March. This came about after we were informed that a soil sample and groundwater monitoring well in the NE corner of the site had high levels of TPH and benzene contamination.

REVIEW OF
PLIMENTAL HRA 6.

TX - looks good! DK

REVIEW OF DTSC-APPROVED "BASELINE HEALTH RISK ASSESSMENT" AND SUPPLEMENTAL RISK CALCULATION; WALKER PROPERTY PREPARED BY Jim Van de Water, Consulting Hydrogeologist and Teri Copeland, Consulting Toxicologist FOR SARIS-REGIS GROUP, March 26, 2002

The scope of this review and supplement was to evaluate additional exposure scenarios relevant to the development proposed by the Saris-Regis Group. The additional exposure scenarios were not included in the original risk assessment reviewed and approved by the DTSC. The two exposure scenarios considered include:

1. Inhalation of vapors from impacted soil and groundwater into indoor air. The receptors considered is a future indoor adult worker in that portion of the property to be developed as warehouses and associated office space.
2. Inhalation of vapors from product-impacted soil into outdoor air in the extreme NE corner of the property (i.e., in the immediate vicinity of soil boring E-1 and groundwater monitoring well EW-1). The receptors considered are a future outdoor adult worker (landscaper) and a future outdoor child (trespasser).

The model(s) used to evaluate the risk are conservative in nature and are widely accepted by regulatory agencies, including the DTSC.

The results presented indicate that the cancer risk (CR) and hazard index (HI) for the indoor worker (1×10^{-7} CR/ 7×10^{-3} HI) and for the outdoor worker/trespasser (2×10^{-8} CR/ 4×10^{-5} HI and 9×10^{-10} CR/ 8×10^{-6} HI, respectively) do not pose a significant risk. Assuming that the calculations are correct, our department agrees with this assessment; however, we do have some concerns with the values used to calculate the indoor air risk model. Our concerns are as follows:

PARAMETERS &

1. The groundwater value used to determine indoor air risk from benzene was 660 ug/l. However, recent data from groundwater monitoring at well EW-1 (March 2002) showed benzene at 1,800 ug/l. The concern is that the level in groundwater underneath proposed buildings may be higher than 660 ug/l.
2. The concentration of benzene in soil at boring E-1 (NE portion of the property) is higher then that used in the indoor air risk assessment. The reason for this is that Saris-Regis does not currently propose any buildings in this area. The soil data from E-1 would need to be incorporated if a building was to be built in this area.

We recommend passive venting for all proposed buildings at this site. This will minimize the risk of inhaling vapors from contaminated soil or groundwater beneath buildings.

DK -

LET ME KNOW IF I CAN SEND THIS TO GIL & OTHERS.

Tom